Periodic Flight Inspection Criteria for Aspen, Colorado Localizer Type Directional Aid

1. PURPOSE. This order establishes special flight inspection criteria and tolerances for Aspen LDA which supports only missed approach and instrument departure procedures.

2. DISTRIBUTION. This order is distributed to the division level in the Offices of Program Engineering Service and Systems Maintenance Service, the branch level in the Office of Flight Standards Service, and the branch level of the Aircraft and Fiscal Programs and Flight Programs Divisions in the Aviation Standards National Field Office, Washington headquarters; the Northwest Mountain Region Flight Standards Division; the branch level in the FAA Academy, Mike Monroney Aeronautical Center; the branch level in the regional Airway Facilities Divisions; and all Flight Inspection Field Offices.

3. BACKGROUND. The rationale for special criteria and tolerances is as follows:

a. Existing localizer criteria and tolerances were designed to support a specific type of operation, an instrument approach to a runway. The tolerances were tailored to meet terminal obstruction requirements throughout the various ILS zones and points predicated about a runway threshold.

b. In contrast, due to special site geography, Aspen LDA is being used in place of a conventional nonprecision navigational aid to support the missed approach and instrument departure procedures. Since the intended operational use of this facility is related to the performance accuracy requirements of a nonprecision navigation aid; all tolerances are established in degrees. The facility is inspected using ILS flight inspection techniques, requiring conversion of degrees to microamperes (uA) in the analysis and reporting of structure and alignment.

4. Flight Inspection Procedures.

a. Checklist. The following procedures pertain to Aspen LDA configured as a dual frequency, localizer type facility. Only the backcourse is used.

Check	Ref Para	Inspection			Transmitter	Configuration
		C	PM	P	Course	Clearance
Mod Lvl	4b	X			Norm	OFF
		X			OFF	Norm
		X	X	X	Norm	Norm
Mod Equal (2)	4c	(1)			Carrier Only	OFF
		(1)			OFF	Carrier Only
Power Ratio	4d	(1)			RF Alarm	Norm
Phasing (3)	4e	(1)			Quad	OFF Set to Value of Mod Equal
		(1)			OFF	Quad Set to Value of Mod Equal
Width & Clearance	4f 4g	(1)			OFF	Norm
		X	X	X	Norm	Norm
Align & Structure	4h 4i	X	X	X	Norm	Norm
Polarization	4j	X	X	X	Norm	Norm
Transition	4k	X	X	X	Norm	Norm
Monitors: Width	4l(1)	X	X		Wide Alarm	Norm
		X	X		Narrow Alarm	Wide Alarm
Align	4l(2)	X	X		Align Alarms	Norm
RF Power	4m	X			RF Alarm	RF Alarm
Identification	4n	X	X	X		
Standby Power	4o	X			Norm	Norm

NOTE:

(1) Maintenance Request

(2) Adjustment to carrier modulation balance will require a subsequent check of course alignment.

(3) Measure width and clearances prior to the phasing check. If, as a result of the quadrature phasing check, the width either remains the same or narrows, and/or clearances increase, then the phasing has been improved.

b. Modulation Level. Measure the modulation of the radiated signal while flying the missed approach/departure course outbound, at the minimum climb rate of 152 feet per nautical mile and between 5 and 15 miles from the LDA antenna. Flag current may fluctuate due to signal reflections; therefore, record the modulation level and construct a graphical average for tolerance application.

c. Modulation Equality. Conduct this check to obtain a crosspointer value which will used as a reference for phasing. Position the aircraft on course, inbound, between 5 and 15 miles, at 17,000 feet. Adjustments to modulation equality will require a subsequent check of course alignment.

d. Power Ratio. The purpose of this check is to measure the ratio of power (using the spectrum analyzer) between the course and clearance transmitters. Position the aircraft inbound, between 5 and 15 miles at 17,000 feet, and compare the relative signal strength of the course and clearance transmitters with the course transmitter in RF power alarm and the clearance transmitter in normal.

e. Phasing.

(1) This check may be conducted to determine that the phase relationship between sideband and carrier energy is optimum. Since the facility is normally phased using ground procedures, airborne phasing is only conducted at the request of maintenance personnel.

(2) Position the aircraft on the appropriate azimuth (obtained from facility maintenance personnel), inbound at 17,000 feet, between 5 and 15 miles. Transmit the crosspointer values to the ground technician for use in adjusting the phasing. The optimum quadrature phase condition occurs when the microampere deflection is equal to that obtained during the modulation equality check.

f. Course Sector Width and Symmetry.

(1) The purpose of this check is to establish and maintain a backcourse sector width and ratio between half-course sectors, that will provide the desired displacement sensitivity required at the procedural missed approach point (MAP). For ease of flyability and to remain within the procedural, protected area, a course width of 10 degrees has been selected as the most desirable to meet both of these objectives at Aspen.

(2) During the commissioning inspection, measure the course sector width and symmetry on a 10-mile arc from the LDA, at both 17,000 feet (provides course stability, good DME update for repeatability, and a safe IFR flight inspection altitude) and for comparability at 20,000 feet, in the normal configuration. If the results at the higher altitude are in tolerance and within $\pm$ 0.2 degrees of the lower altitude, any altitude between 17,000 and 20,000 feet inclusive may be used on subsequent inspections. Document the results of the comparability check on the facility data sheet.

g. Clearance.

(1) Measure clearances in sector 1 to ensure that the facility provides adequate off-course indications throughout the service volume. During commissioning, conduct the check on a 10-mile arc from the LDA antenna at both 17,000 feet and, for comparability, at 20,000 feet. If clearances at the higher altitude are equal to or lower than clearances at the lower altitude, then an altitude between 17,000 and 20,000 feet inclusive may be used on subsequent inspections. Document the results of the comparability check on the facility data sheet.

(2) During the commissioning inspection, check clearances in both normal and the monitor alarm configurations, e.g., course transmitter in narrow alarm and clearance transmitter in wide alarm. On subsequent periodic with monitor inspections, check clearances in the normal configuration only if the clearances found during the monitor alarm configuration are less than the tolerances for normal.

h. Course Alignment. Measure alignment (either inbound or outbound) on the procedural azimuth using a well-defined checkpoint, theodolite, or AFIS. Document the method used in the remarks section of the flight inspection report. Document the visual checkpoint and altitude in the commissioning report and on the facility data sheet.

i. Course Structure. Measure structure while flying outbound, on the procedural azimuth, from 5 to 21.1 miles (inclusive), maintaining 12,550 feet MSL.

j. Polarization Effect. This check may be accomplished concurrently with the course structure check. Bank the aircraft 20 degrees left and right. Activate the event mark at the maximum banked attitudes.

k. Transition. Because the missed approach routing is a transition from the missed approach point to the operational service volume of the LDA facility, and the transition termination point is not identified with a facility other than the LDA course, check clearances in RF power alarm along the missed approach routing.

(1) Commissioning. Starting at the MAP, 100 feet below the minimum descent altitude (MDA), fly the missed approach procedure at the approximate climb rate of 152 feet per mile, until intercepting the LDA. Repeat the maneuver, except climb expeditiously to and maintain 14,000 feet to intercept.

(2) Periodic. Fly a normal published missed approach procedure from the MAP, starting at 100 feet below the MDA, until intercepting the LDA on course.

l. Monitors--Width and Alignment. Check monitors when prescribed by the checklist, when applicable on special inspections, and at the request of maintenance personnel. If the facility is found operating out-of-tolerance, check the monitor which should have sensed the out-of-tolerance condition.

(1) Width Monitor. Use the procedures and methods described in paragraph f. At the conclusion of the inspection, return the facility to normal and check and report the resulting course sector width and symmetry.

(2) Alignment Monitor. Position the aircraft on the designed procedural azimuth, between 5 and 15 miles, at an altitude where the signal is free of reflections. Request the course be misaligned to the monitor alarm limits each side (90Hz/150Hz) operational course. Use both the recording device and meter values to verify course alignment shifts. Measure the alignment shifts to monitor alarm by recording a constant track by visual reference to the ground; this may be accomplished on one run during which both alarm points and a return to normal are recorded.

m. RF Power Monitor. This inspection is conducted to determine that the LDA meets specified tolerances throughout its operational interference, signal strength, clearance, flag alarm current, identification, and structure as follows:

(1) Start 5 miles from the LDA at 11,000 feet. Climb outbound on course at an approximate rate of 152 feet per mile. Cross LINDZ at 12,500 feet and 26.1 miles at 12,900 feet.

(2) Fly an arc across the LDA course at 26.1 miles from the antenna at 12,900 feet throughout sector 1.

(3) Repeat step 2, except fly the arc at 20,000 feet.

(4) Fly an arc across the LDA course at 10 miles from the antenna at 20,000 feet throughout sector 1.

(5) Repeat step 4, except fly the arc at 12,900 feet.

n. Identification. Record the identification during all checks. Restrict the facility if identification cannot be received in all areas of required coverage.

o. Standby Power. Check standby power during the first periodic or special flight inspection after it is installed. The check consists of taking comparative measurements of facility performance on each power source. When the facility is powered by in-line “floating” batteries, a standby power check is not required.

p. Service Volume. Frequency protection for this facility has been approved to 20,000 feet MSL and 26.1 miles. The operational service volume for flight inspection purposes is as follows:

(1) Longitudinally from 5 to 21.1 miles.

(2) Laterally 10 degrees each side of course.

(3) Vertically ascending to 12,550 feet MSL at 21.1 miles for the lower limit and 20,000 feet for the upper limit.

q. Analysis.

(1) There is no requirement for inspecting the LDA inside 5 miles, unless required for determining alignment.

(2) Clearance deviations in sector 1 to less than tolerance are not acceptable. Momentary clearance deviations to below tolerance are acceptable in the transition area, provided that there is no cockpit indication of a false course and that the aggregate area does not exceed 3 degrees of arc.

r. Tolerances. Course structure, width, and alignment tolerances, similar to what applies to a nonprecision air navigation facility (NAVAID), have been used for this facility based on the additional airspace protected by nonprecision terminal instrument procedures (TERPS) criteria. Any modification or change to less restrictive procedural, protected areas will invalidate these tolerances. Actual tolerances are in degrees; the uA values shown in parenthesis, based upon a 10-degree course (30 uA = 1), are provided for reporting purposes.

CODES:

C - Tolerances applied to site, commissioning, or reconfiguration inspections.

P - Tolerances applied to any inspection subsequent to the inspection outlined in Code C.

Parameter	Ref Para	Inspection		Tolerance/Limit
		C	P	
(1) Mod Lvl	4b	X	X	20% $\pm$ 2%
(2) Power Ratio	4d	X	X	Course transmitter power level output at least 10 dB greater than the clearance transmitter.
(3) Phasing	4e	As required		No tolerance.
(4) Width	4f	X		$10^{o} \pm 0.1^{o}$
			X	$10^{o} \pm$ 17%

Parameter	Ref Para	Inspection C	Inspection P	Tolerance/Limit
(5) Symmetry	4f	X	X	Facility normal: 45-55%
(6) Alignment	4h	X	X	Designed procedural azimuth $\pm$ 2.5^0 ($\pm$ 75 uA)
(7) Structure	4l	X	X	$\pm$ 3.0^o ($\pm$ 90 uA) from the average course signal.
(8) Polarization	4j	X	X	Maximum effect: $\pm$ 15uA
(9) Monitors Align	4l(2)	X	X	$\pm$ 1.0^o ($\pm$ 30 uA from designed procedural azimuth.
Width	4l(1)	X	X	Not to exceed 10^o $\pm$ `7%
RF Power	4m	X		Maintained at or above: Signal strength--5uV Flag alarm current--240uA Clearance and structure--in tolerance.
(10) Transition	4k	X	X	At or greater than: Signal strength--5 uV Flag alarm current--240 uA Clearance and structure--in tolerance. Interference--shall not cause an out-of-tolerance condition.
(11) Clearance	4g			Measured from procedural azimuth:
Normal		X	X	Sector Minimum clearance 1 Linear increase to 175uA then maintain 175uA to 10^o. 2 150uA (see NOTE)
Facility in any alarm configuration		X	X	Clearances are reduced 15uA from those required in normal.
(12) Identification	4n	X	X	Clear, correct; identification shall have no effect on the course.

5. Periodicity. Inspect Aspen LDA in accordance with the periodicity requirements in Order 8200.1A, United States Standard Flight Inspection Manual, Paragraph 105.41 and Table 105-1.

6. Reporting. Report the results of Aspen, Colorado, LDA inspections on FAA Forms 8240-1, Flight Inspection Report--Instrument Landing System, and 8240-18, Flight Inspection Report--Localizer Clearance Plot (as appropriate) in accordance with Order 8240.36, Instructions for Flight Inspection Reporting (latest revision) except for:

a. Field 7, Runway No.: enter “RWY 00”.

b. Field 8, Facility Inspected: Place an “X” in the LDA box and write in after LDA “\Depart”.

c. Field 9, leave the “Category” box blank.

d. Report all results as a back course; report all course structure in the box for Zone 1 with distance relative to the LDA antenna position.

e. Field 13, Remarks: Include the comment, “Aspen, CO, LDA inspected using criteria and tolerances contained in FAA Order 8200.32”.

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